

ideas make future

LAMBDA controller type LCA80

designed for LAMBDA sensor
LSU4.9 & LSU4.2

Brief description

Product LAMBDA controller type LCA80 is separate module for control and signal processing of wideband Lambda sensor type LSU 4.9 and LSU 4.2 (replacement LSM 11). The product is suitable for measuring the LAMBDA value, the ratio of AFR and O₂ in combustion engine cogeneration units, boilers burning gas or biomass or other applications.

LAMBDA controller is based on circuit BOSCH CJ125 which serves basic function of oxygen sensor along with supporting microprocessor for filtering and control. Microprocessor also provides forwarding data to the diagnostic interface USB, Analog output - AO or CANbus in protocol SAE J1939 or CANopen. Lambda heater is controlled by PID regulator and the resistance of measuring cell (Nerns Cell) with auto-off option according to engine speed received from CANbus / J1939.

LAMBDA controller processes and visualizes data about Lambda mixture – λ , Oxygen – O₂, Ratio – A/F, Sensor temperature – T [°C], Supply voltage – U[V], Analog output – AO [V] and Engine speed – RPM (speed takes from CANbus / J1939).

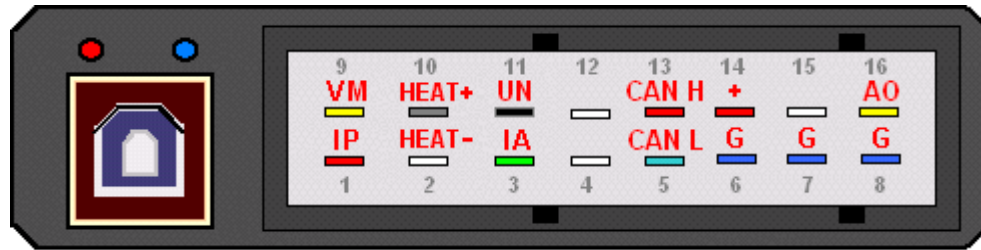
LAMBDA controller can be directly included in the ECU MASTER unit as extended module. This solution is possible only for units with four outputs, such as MASTER 4TCI or MASTER 2CDI 2TCI. For units with ten outputs is possible connection by CANbus – J1939 interface.

Main Features

- ✓ Supply voltage range 7 to 36V (12V/24V)
- ✓ Consumption 10W (Lambda heater)
- ✓ Operation temperature -40 to 85 °C
- ✓ Support for Lambda sensor type: LSU 4.9 and LSU 4.2 (replacement LSM 11)
- ✓ Used BOSCH CJ125 circuit and microprocessor support
- ✓ Visualization:
 - Lambda – λ 0.7 to 12.5 ($\pm 0.1\%$)
 - Oxygen – O₂ -7.5 to 20% ($\pm 0.1\%$)
 - Ratio – A/F Gasoline, Diesel, Methanol, Ethanol
E85, LPG, CNG, Hydrogen
 - Temperature – T [°C] -40 to 1050 °C ($\pm 3\%$)
 - Supply voltage – U [V] 7 to 50V ($\pm 2\%$)
 - Analog output – AO [V] 0 to 5V ($\pm 0.5\%$)
 - Engine hours [h:m:s]
- ✓ CANbus support at protocol SAE J1939 or CANopen (250kbps)
- ✓ Supported connection or integration with ECU MASTER
- ✓ Galvanically isolated USB – USB protection against earth fault and EMC disturbances
- ✓ PC application – to visualize measured values
- ✓ Measuring the supply voltage
- ✓ No Calibration required
- ✓ Connector – TYCO automotive
- ✓ Protection class – IP65
- ✓ Dimensions 105x60x37mm



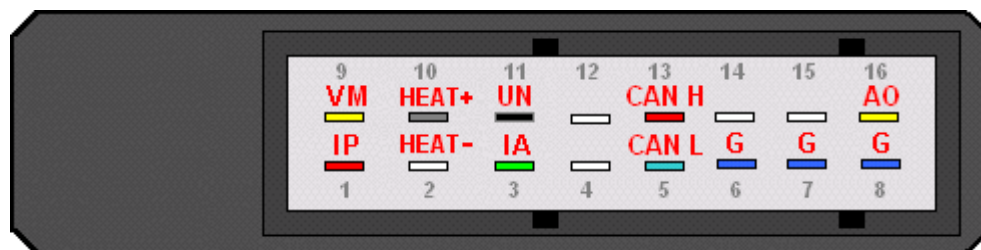
Connector wiring – LAMBDA controller



MARKING	MEANING	RANGE, ACTIVE LEVEL
+	Power supply	7 to 36V (12V/24V)
G	Ground supply	0V
CAN H CAN L	CAN bus	SAE J1939 / CANopen 250kbps
AO	Analog Output	0-5V ($\pm 0.5\%$)
LSU 4.9 (LSU 4.2)		
IP (red)	Lambda LSU - pin 1 (6*)	IP/APE - pump current shunt input
VM (yellow)	Lambda LSU - pin 2 (5*)	VM/IPN - virtual ground output
HEAT- (white)	Lambda LSU - pin 3 (4*)	Uh-/H- - heating +
HEAT+ (grey)	Lambda LSU - pin 4 (3*)	Uh+/H - heating +
IA (green)	Lambda LSU - pin 5 (2*)	IA/RT - pump current control output
UN (black)	Lambda LSU - pin 6 (1*)	UN/RE - inverting input of pump

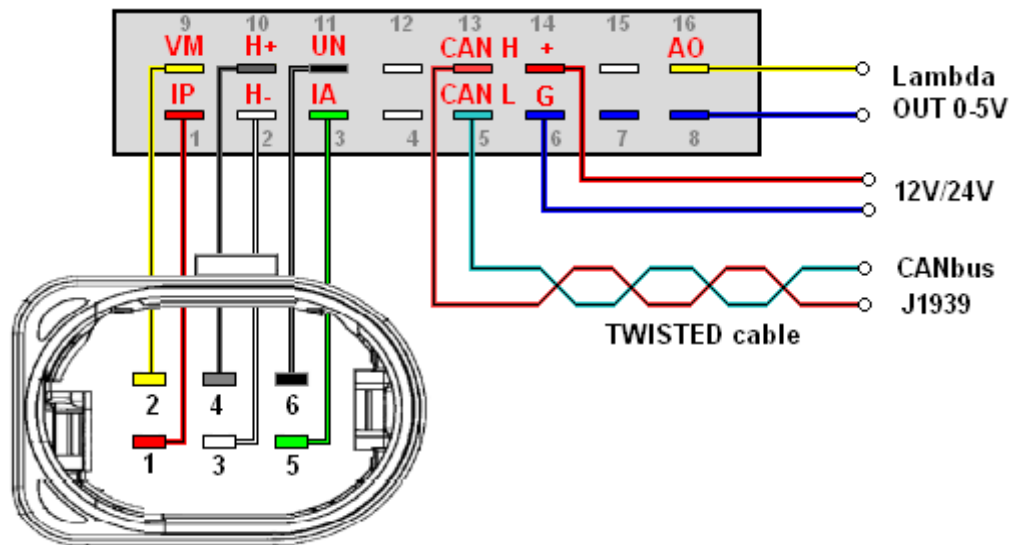
* Index of pins depends on Lambda sensor type

Connector wiring – MASTER back connector (alluminium case - extended)

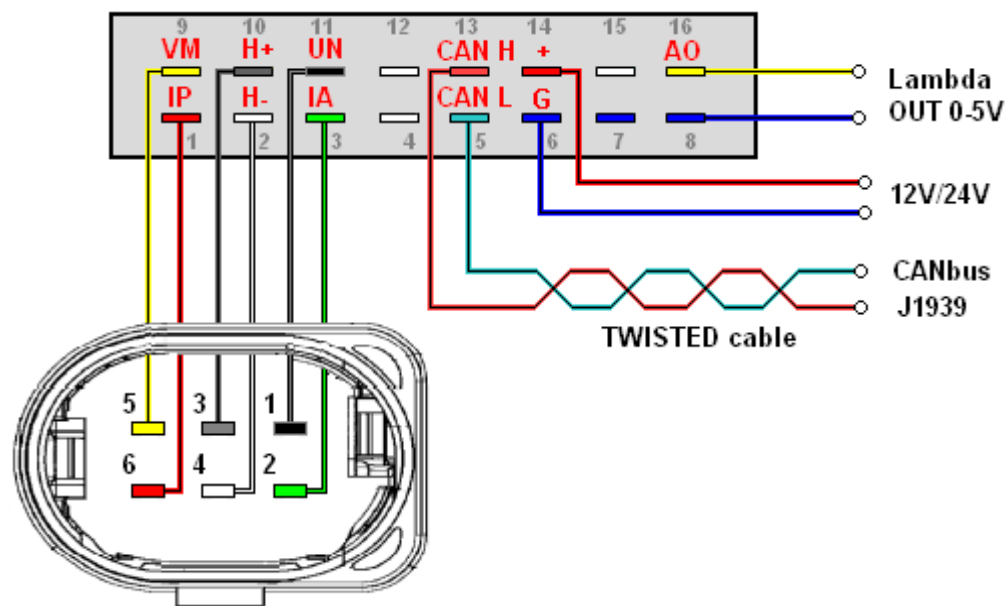


LAMBDA controller can be directly included in the ECU MASTER unit as extended module. This solution is possible only for units with four outputs, such as MASTER 4TCI or MASTER 2CDI 2TCI. Supply power is provided from the main connector of the MASTER ECU.

Connector wiring – LAMBDA sensor LSU 4.9

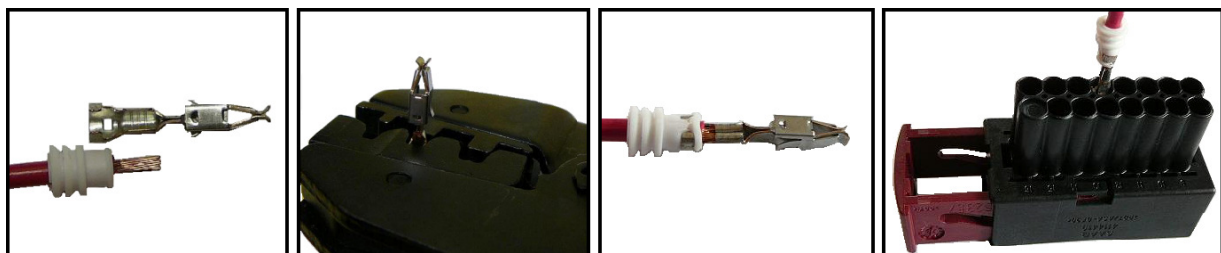


Connector wiring – LAMBDA sensor LSU 4.2



Connector crimping

Connector crimping requires similar procedure as for FASTON connector, but there is moreover used sealing rubber grommets. Regarding tool, it can be done with standard crimping pliers FASTON 1.5mm – 2.5mm. For blockage of unused terminal connectors TYCO it is appropriate to use supplied rubber plugs to comply with IP65 degree of protection.



Application LAMBDA control – visualization software

Visualization is done from application *LAMBDA control* run on your PC. The application works under *Windows XP* and higher. Installation requires 4MB of free space at your hard disc.

To connect lambda to PC is used USB interface. Driver for USB is included on the installation CD.

Visualized information

- Lambda – λ
- Oxygen – O₂
- Ratio – A/F
- Temperature – T [°C]
- Supply voltage – U [V]
- Analog output – AO [V]
- Revolutions [RPM]
- Engine hours [h:m:s]



Run the visualization

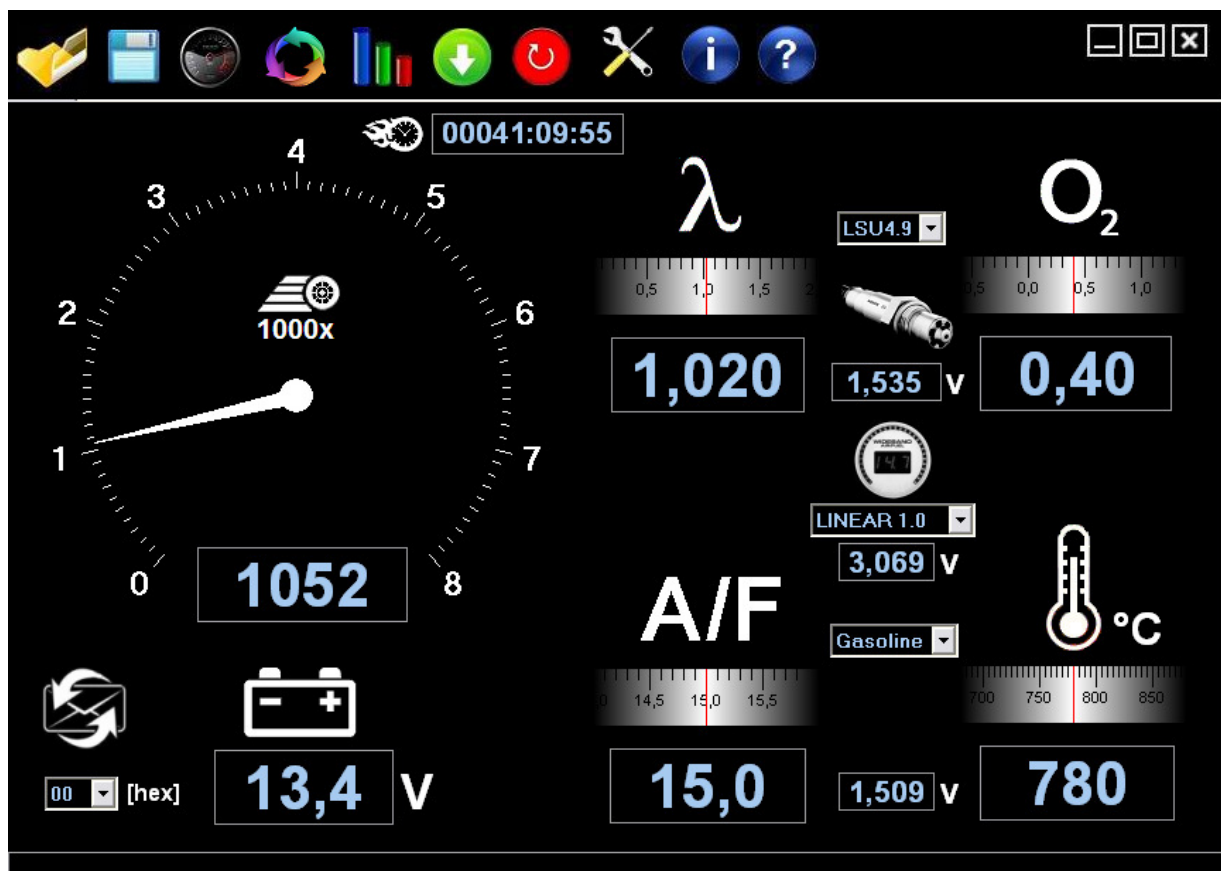


Table – AFR – Fuels

Gasoline, Diesel, Methanol, Ethanol, E85, Propane (LPG), Methane (CNG), Hydrogen

LAMBDA	O2	AFR - Air Fuel Ratio								
		[-]	[%]	Gasoline	Diesel	Methanol	Ethanol	E85	LPG	CNG
0,70	-7,80		10,3	10,2	4,5	6,3	6,8	10,9	12,0	22,7
0,75	-6,35		11,0	10,9	4,8	6,8	7,3	11,6	12,9	24,3
0,80	-4,76		11,8	11,6	5,1	7,2	7,8	12,4	13,8	25,9
0,85	-3,36		12,5	12,3	5,4	7,7	8,2	13,2	14,6	27,5
0,90	-1,95		13,2	13,1	5,8	8,1	8,7	14,0	15,5	29,2
0,95	-0,97		14,0	13,8	6,1	8,6	9,2	14,7	16,3	30,8
1,00	0,00		14,7	14,5	6,4	9,0	9,7	15,5	17,2	32,4
1,05	0,99		15,4	15,2	6,7	9,5	10,2	16,3	18,1	34,0
1,10	1,98		16,2	16,0	7,0	9,9	10,7	17,1	18,9	35,6
1,15	2,93		16,9	16,7	7,4	10,4	11,2	17,8	19,8	37,3
1,20	3,52		17,6	17,4	7,7	10,8	11,6	18,6	20,6	38,9
1,25	3,98		18,4	18,1	8,0	11,3	12,1	19,4	21,5	40,5
1,30	4,70		19,1	18,9	8,3	11,7	12,6	20,2	22,4	42,1
1,35	5,26		19,8	19,6	8,6	12,2	13,1	20,9	23,2	43,7
1,40	5,86		20,6	20,3	9,0	12,6	13,6	21,7	24,1	45,4
1,45	6,38		21,3	21,0	9,3	13,1	14,1	22,5	24,9	47,0
1,50	6,87		22,1	21,8	9,6	13,5	14,6	23,3	25,8	48,6
1,60	7,67		23,5	23,2	10,2	14,4	15,5	24,8	27,5	51,8
1,70	8,43		25,0	24,7	10,9	15,3	16,5	26,4	29,2	55,1
1,80	9,19		26,5	26,1	11,5	16,2	17,5	27,9	31,0	58,3
1,90	9,66		27,9	27,6	12,2	17,1	18,4	29,5	32,7	61,6
2,00	10,18		29,4	29,0	12,8	18,0	19,4	31,0	34,4	64,8
2,50	12,26		36,8	36,3	16,0	22,5	24,3	38,8	43,0	81,0
3,00	13,70		44,1	43,5	19,2	27,0	29,1	46,5	51,6	97,2
3,50	14,80		51,5	50,8	22,4	31,5	34,0	54,3	60,2	113,4
4,00	15,49		58,8	58,0	25,6	36,0	38,8	62,0	68,8	129,6
5,00	16,57		73,5	72,5	32,0	45,0	48,5	77,5	86,0	162,0

Table – Engine AFR – Power / Emissions / Economy

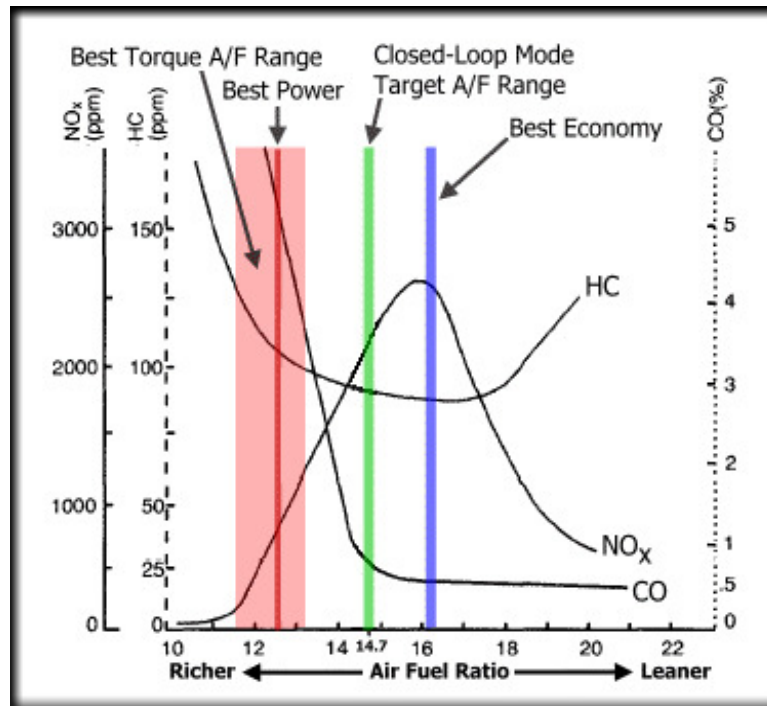
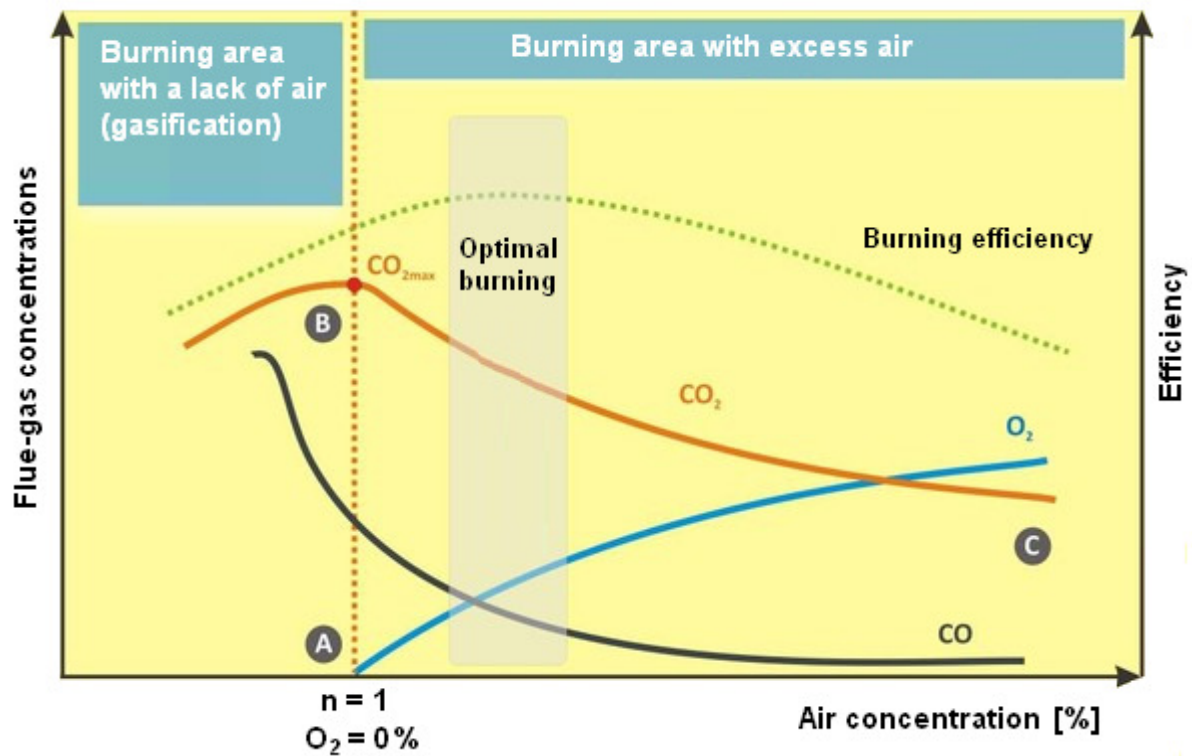
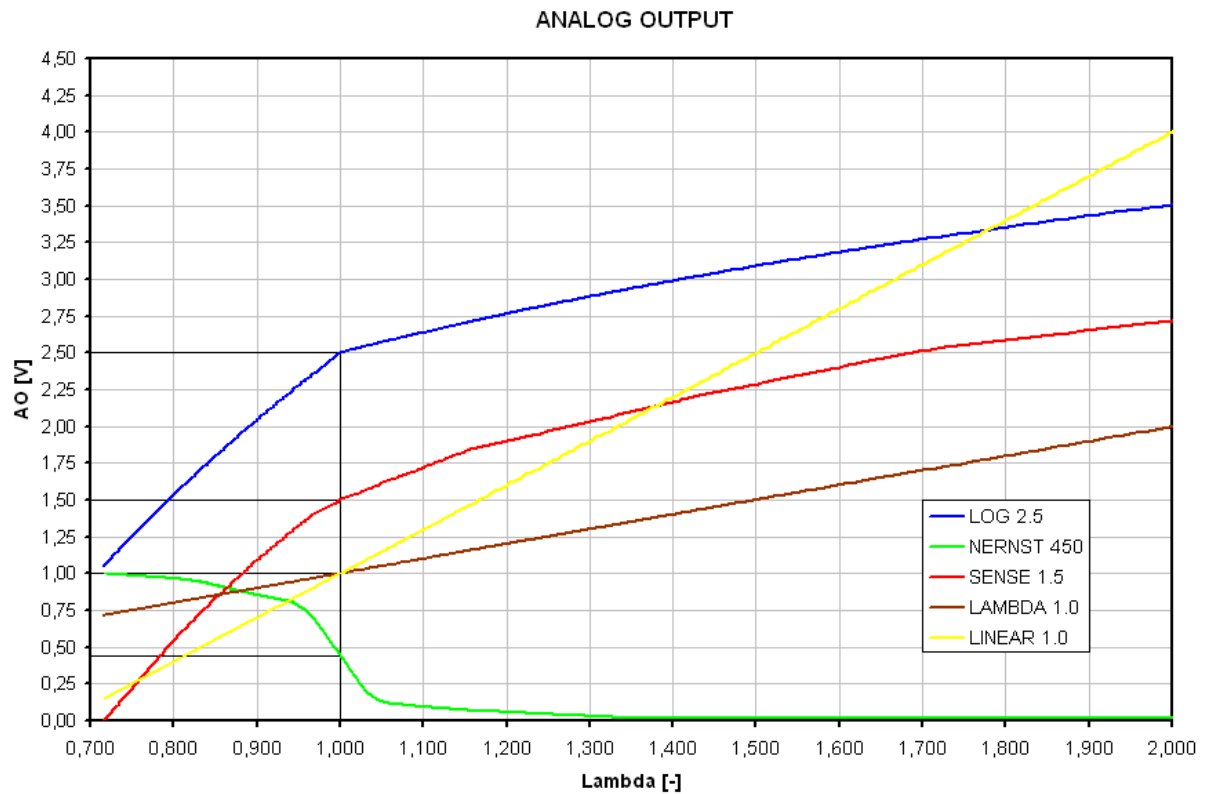


Table – Boilers O2 – Power / Emissions / Efficiency



LAMBDA – Analog Output – AO

LAMBDA controller is able to generate an analogue output depending on measurement of the immediate LAMBDA values. Output curve can be adjusted to five different waveforms, any further are possible to add upon your special requirement. The exact value of each voltage curves are displayed in a separate file LAMBDA_AnalogOUT (1002-0022-14).



LAMBDA sensor LSU 4.9 – BOSCH 0 281 004 148 or BOSCH 0 258 017 025



Assembly drawings

